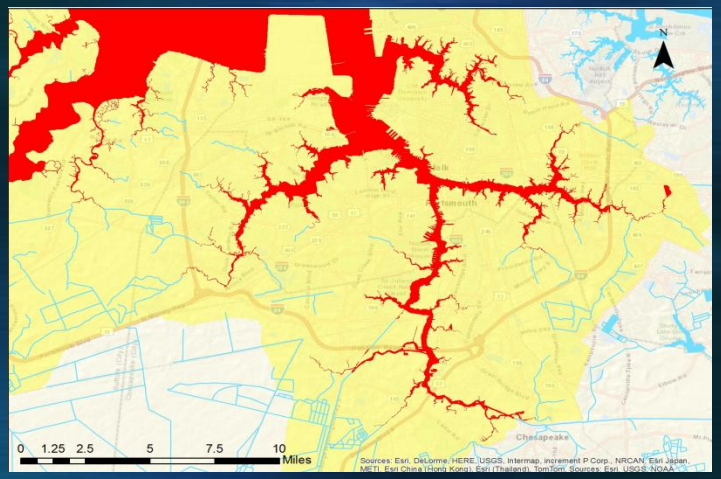
Elizabeth River PCB TMDL Public Informational Update Meeting



Mark Richards
Virginia Department of Environmental Quality
March 25, 2014

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Topics

- Fish Consumption Advisory
- PCB Background
- TMDL Development
- PCB Source Investigation Update
- Project Timeline

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PCB Fish Consumption Advisory

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DEQ Fish Tissue Monitoring

- Monitor to assess the "Fishable" Goal of the Clean Water Act - 305(b)
- Target "fat loving" contaminants that accumulate in tissue
  - PCBs, Pesticides, etc.
- Compare to threshold values (protect human health)
  - Listed on "dirty waters" report if exceeds - 303(d)

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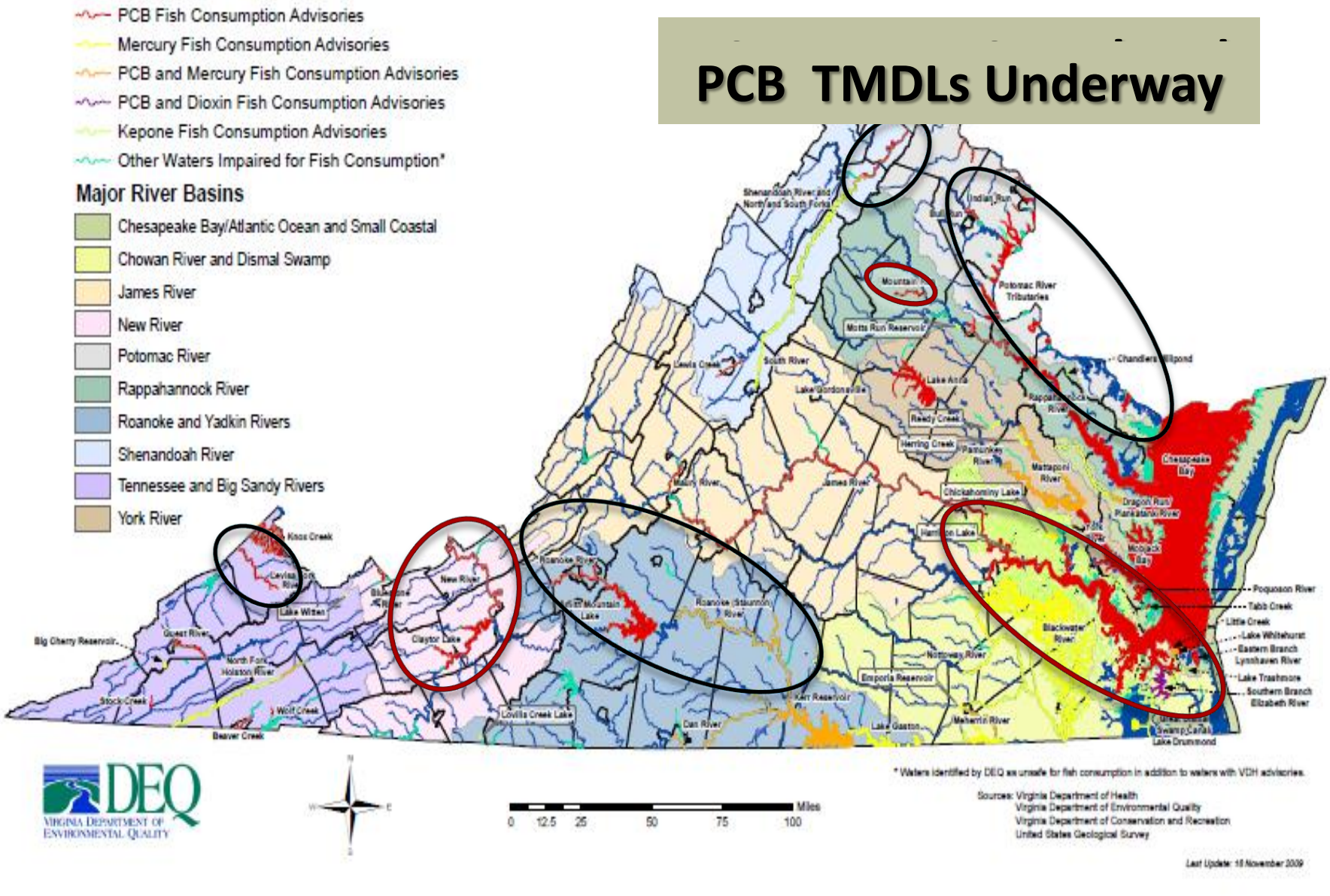
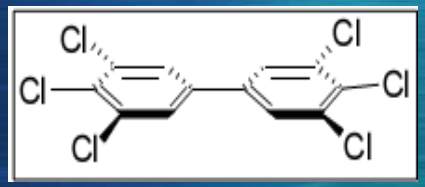
Waters Under VDH Fish Consumption Advisories

Identified in the 2012 305(b)/303(d) Water Quality Integrated Report



Elizabeth River PCB Fish Consumption Advisory Timeline



DEQ Initiates TMDL Monitoring 2009

DEQ Initiates Series of TMDL Meetings (2009, 2010)

1993
Original Tissue Collected

2004
VDH Listed Consumption Advisory
James River & tributaries
(1,700 ppb)

2004
VDH Lowers to 50 ppb

2006
Advisory Modified to Current Form (~216 Sq Miles)

2012
New Fish Tissue Collected

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VA Water Quality Criterion-Total PCBs

- Acute/Chronic criterion
- Tissue and Public Water Supply - criterion represents concentration in the water column where the bioaccumulation of tPCBs in fish and drinking water is minimized for safe human consumption (back-calculated from fish tissue)

PCB WQC

Consumption Advisories Fish Tissue (ppb)		Water Quality Criterion (ppb)
VDH (50)	DEQ (20)	0.00064

FDA Threshold (1984) for prohibition of interstate commerce in fish tissue = 2.0 ppm (or 2,000 ppb)

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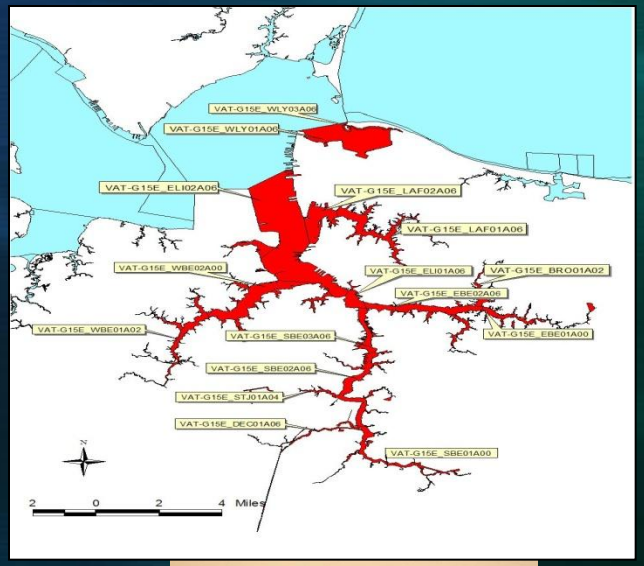
Elizabeth River Fish Consumption Advisory (VDH) for PCBs

Willoughby Bay and the Elizabeth River system (Western Br., Eastern Br., Southern Br., and Lafayette River) and tidal tributaries St. Julian Creek, Deep Creek, and Broad Creek

Fish Species	Advisory
Gizzard Shad, Carp, Blue Catfish & Flathead Catfish ≥ 32 inches	**Do Not Eat**
Blue Catfish & Flathead Catfish < 32 inches, Channel Catfish, White Catfish, Largemouth Bass, Bluegill Sunfish, **American Eel**, Quilback Carpsucker, Smallmouth Bass, Creek Chub, Yellow Bullhead Catfish, **White Perch**, **Blueback Herring**, **Striped Bass**, Hickory Shad, **Croaker, Spot, Bluefish**	**No more than two meals/month**



Southern Branch of the Elizabeth River and its tidal tributaries

DO NOT EAT crab's hepatopancreas ("mustard," green gland, tomalley). Only applies to eating the "mustard". Crab meat is not subject to this advisory (1/23/2009)

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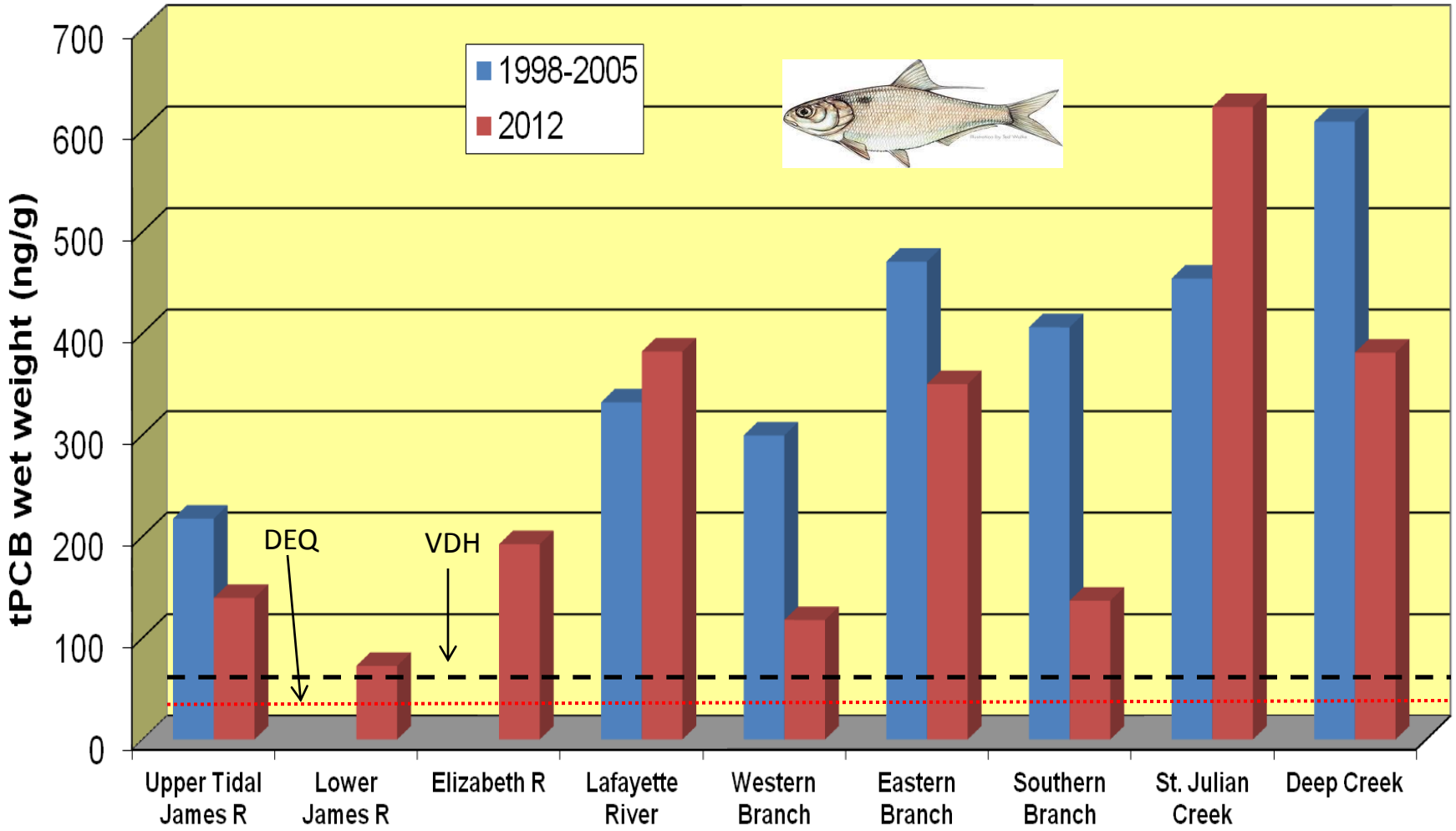
Mean Total PCB Concentration in Gizzard Shad in the Elizabeth River Watershed (1998-2005 & 2012)



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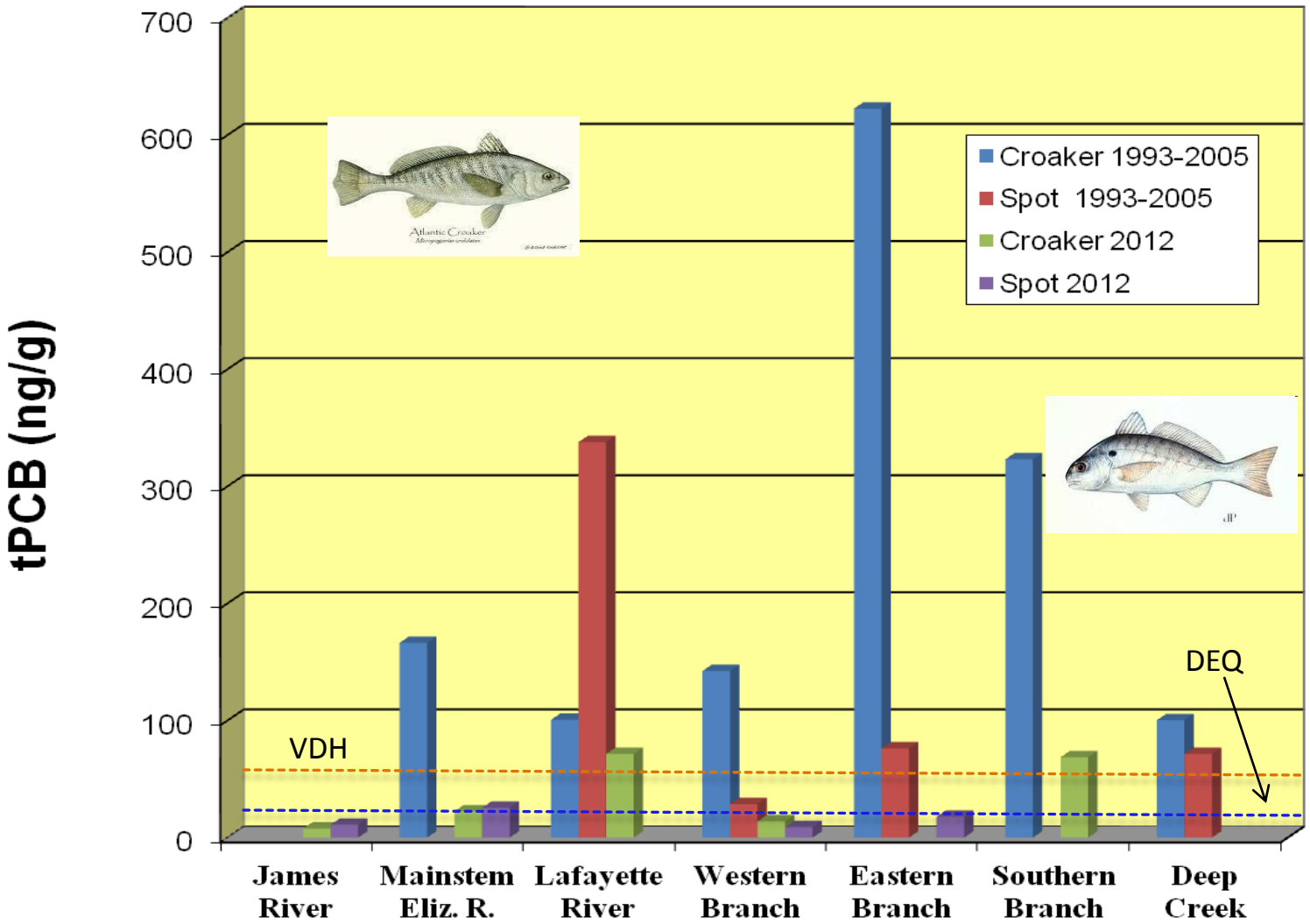
Mean Total PCB Concentration in Croaker & Spot in the Elizabeth River Watershed (1993-2005 & 2012)



Missing Bar = Sample not collected

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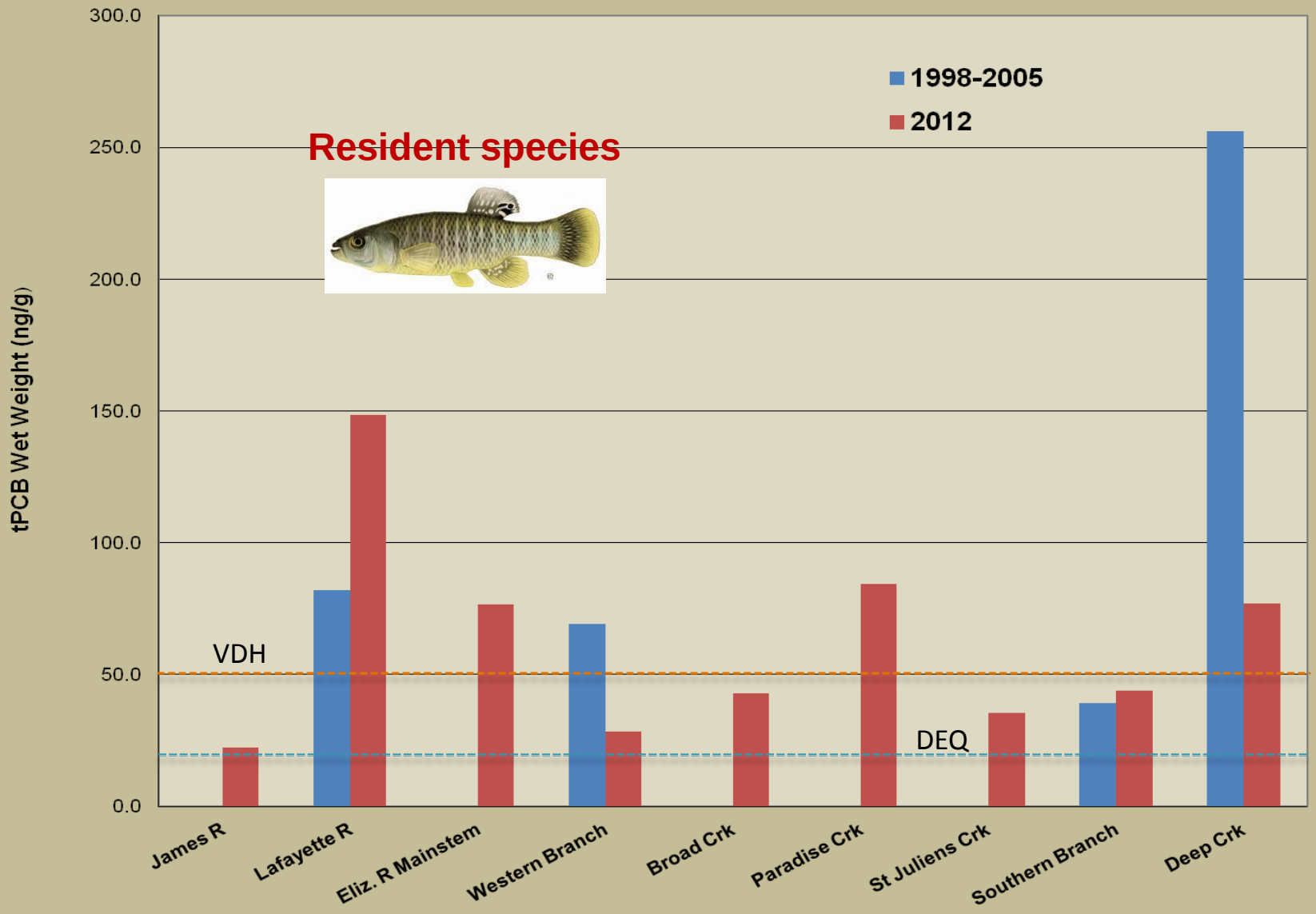
Mean Total PCB Concentration in Mummichog from the Elizabeth River Watershed (1998- 2005 & 2012)



Missing Bar = Sample not collected

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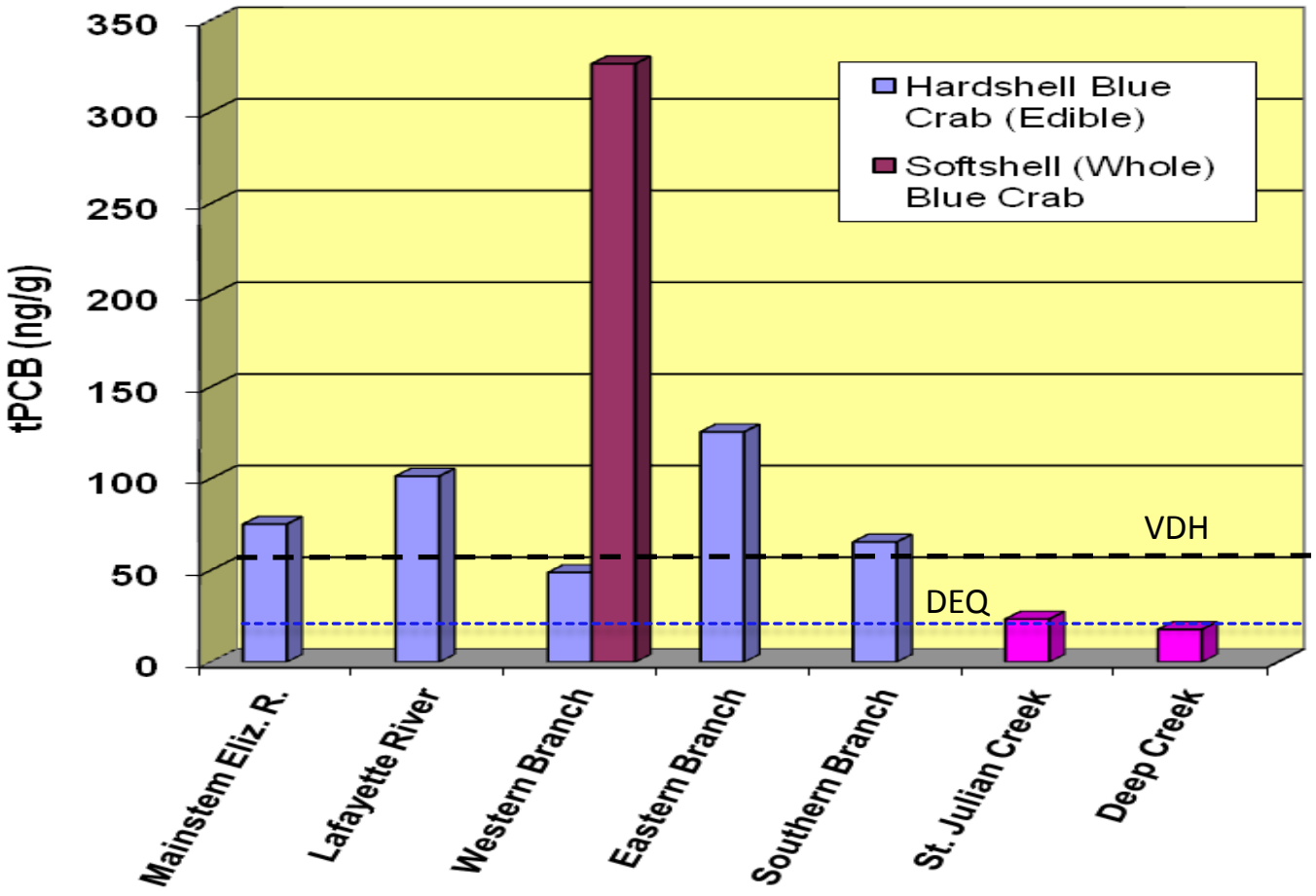
Mean Total PCB Concentration from Blue Crabs Collected in the Elizabeth River Watershed (1993-2005)



No Samples Collected in 2012

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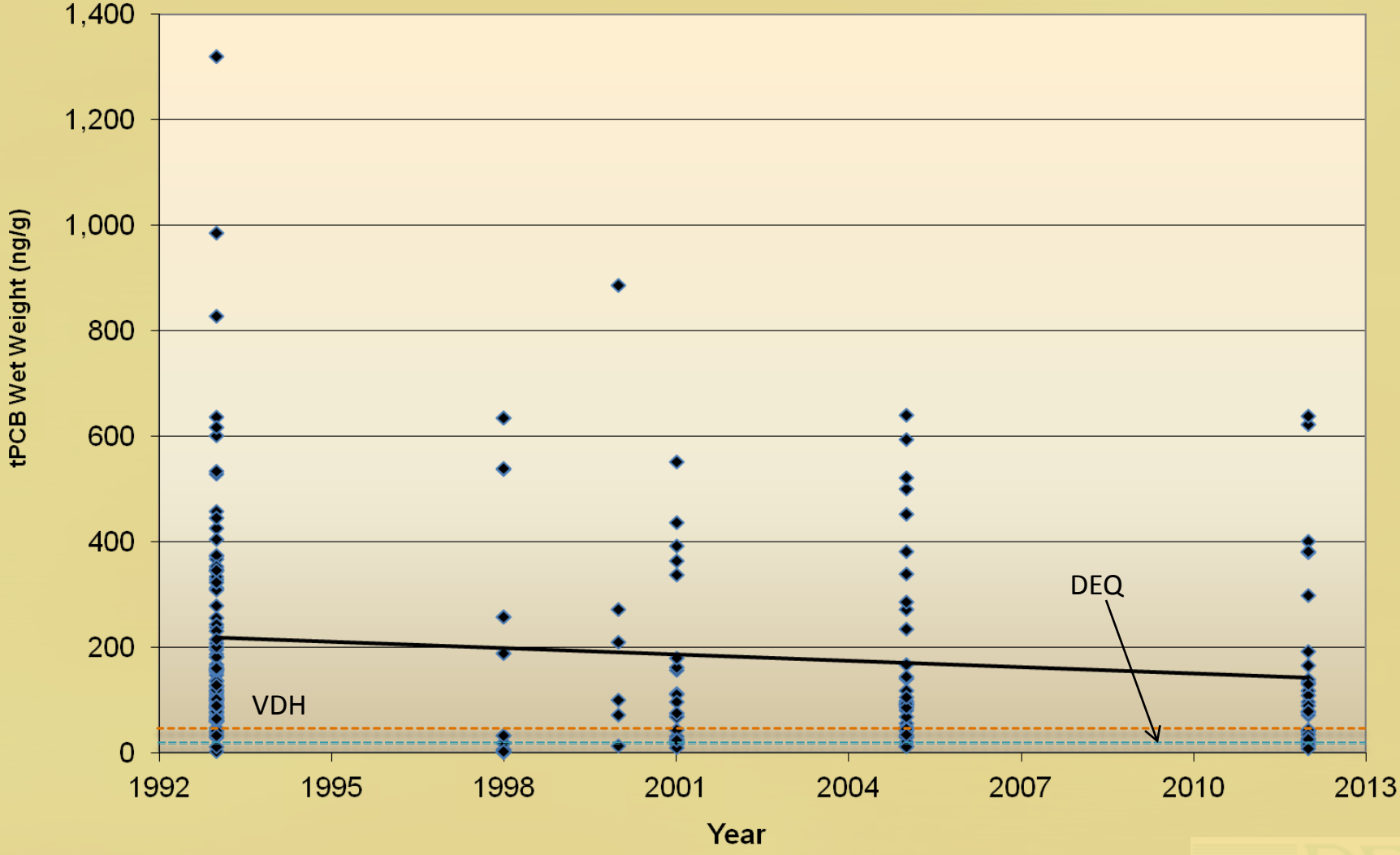
Total PCB (ng/g) Concentrations in all Fish Species Collected from the Elizabeth River Watershed From 1993 - 2012



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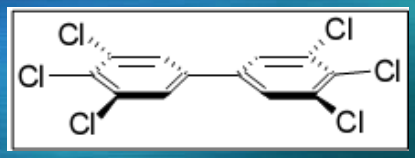
Polychlorinated Biphenyls



- 209 Distinct PCB compounds (mixtures = Aroclors)
- Highly valued properties – chemically inert, non-flammable, heat resistant
  - Used as a coolant & insulating fluid in electrical equipment
  - Other uses: plasticizers, lubricating oil, hydraulic fluid, carbonless copy paper
- Legacy Contaminant
  - Banned in the late 1970's
  - Not detected in wastewater since the 1980's (methods lack sensitivity)

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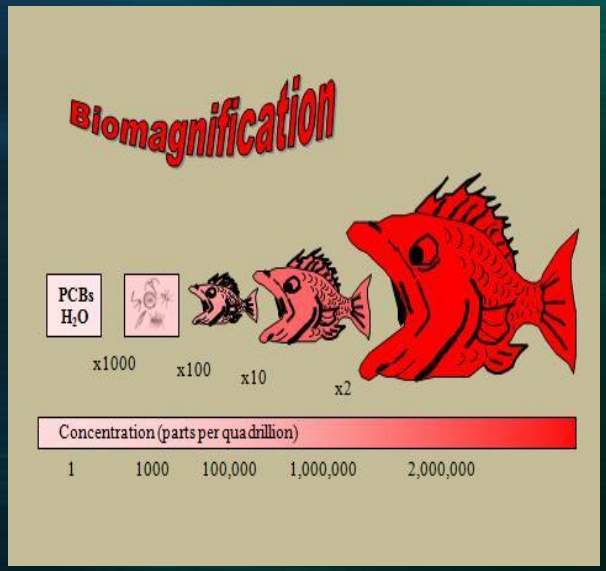
PCBs Continue to be an Issue – Why?

- Fish impairments based on human health concerns
  - Fish consumption is significant exposure pathway
    - Suspected carcinogen (EPA)
      - IARC upgraded to carcinogen
    - Immunotoxicity, reproduction and developmental, hepatotoxicity (liver), etc.
- Persistent, bioaccumulates at low conc. (pg/L) & biomagnifies
- Confirmed on-going releases



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PCB TMDL Development

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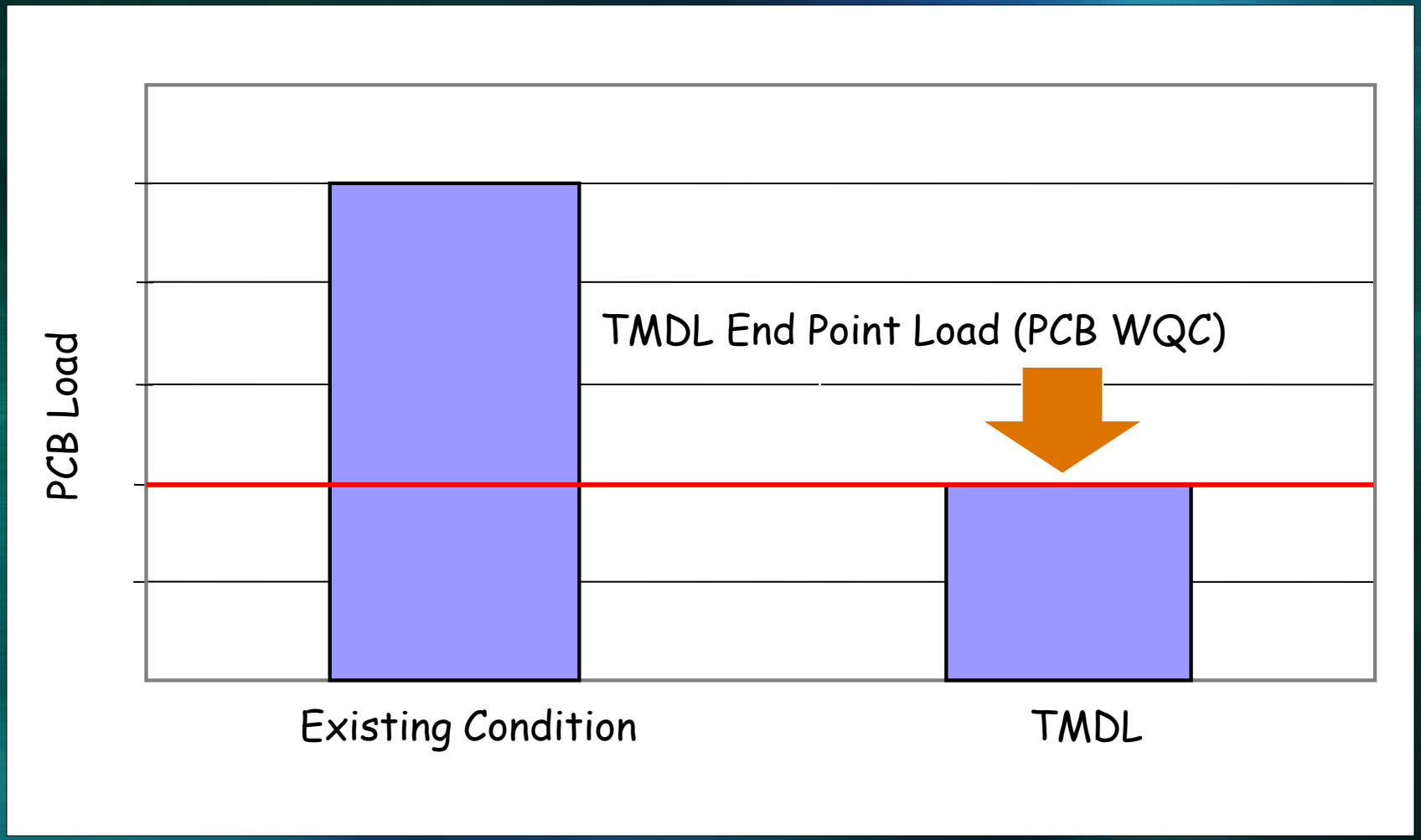
An Example TMDL



Reducing existing pollutant load to the TMDL end point load is expected to restore fish consumption use

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PCBs – Fate & Transport/Sources

4
Wet and dry Deposition

Volatilization

3
Contaminated site

Off-gas

SW Runoff
MS4

2

Effluent
/CSO

1

Outflow

Inflow/Runoff

Dissolved Phase

PCBs

Particulate Phase

PCBs

Bioaccumulate &
Biomagnify

PCBs

Readsorption/
Settling/
Resusp/
Diffusion

Settling/Resusp
Diffusion

PCBs

PCBs

Burial

Burial

5
Sediment

1 Effluent/CSO
2 MS4/ SW Runoff
(Direct Drainage)
3 Contam. sites
4 Air Deposition
5 Sediment

PCB Source Investigation Update

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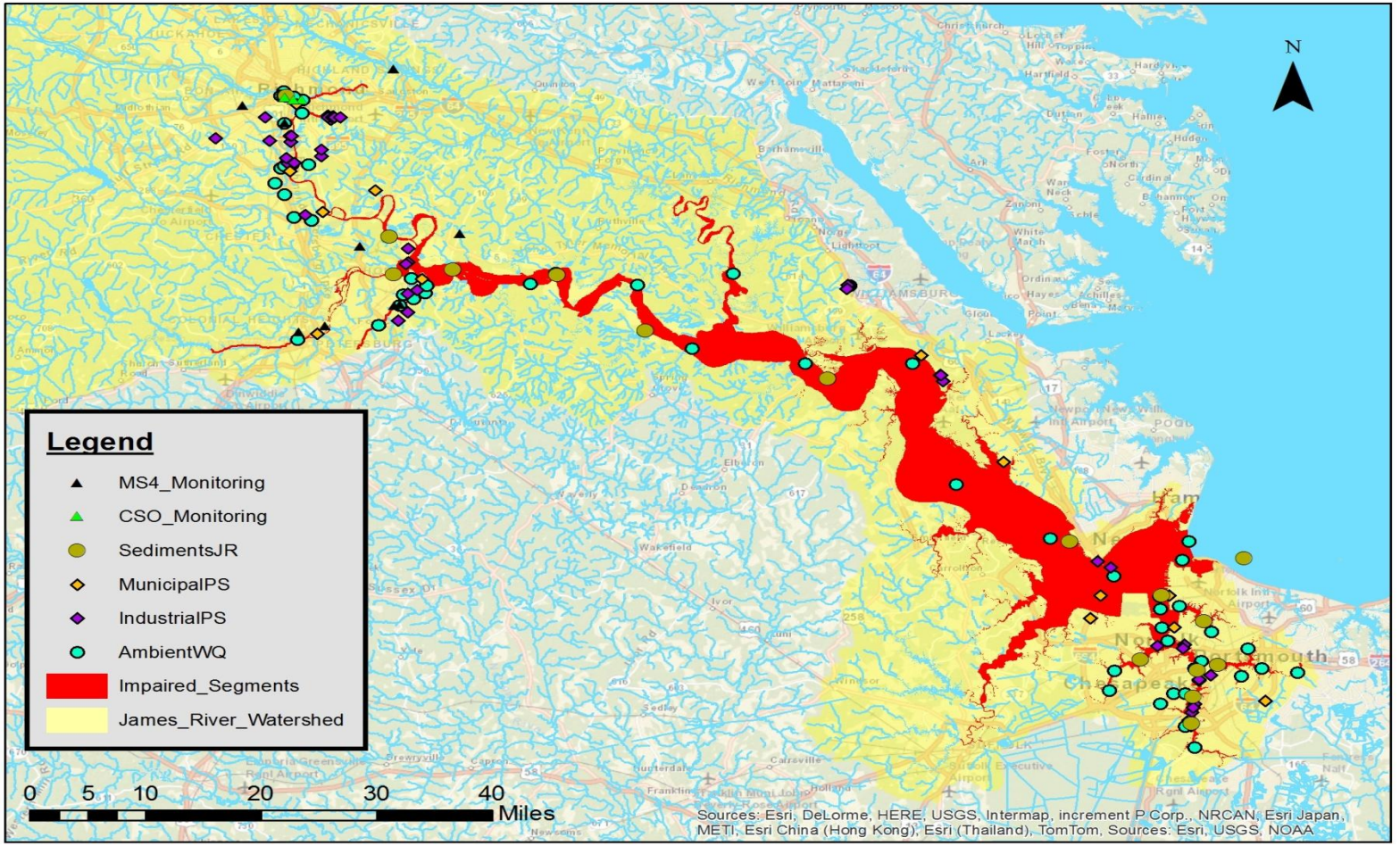
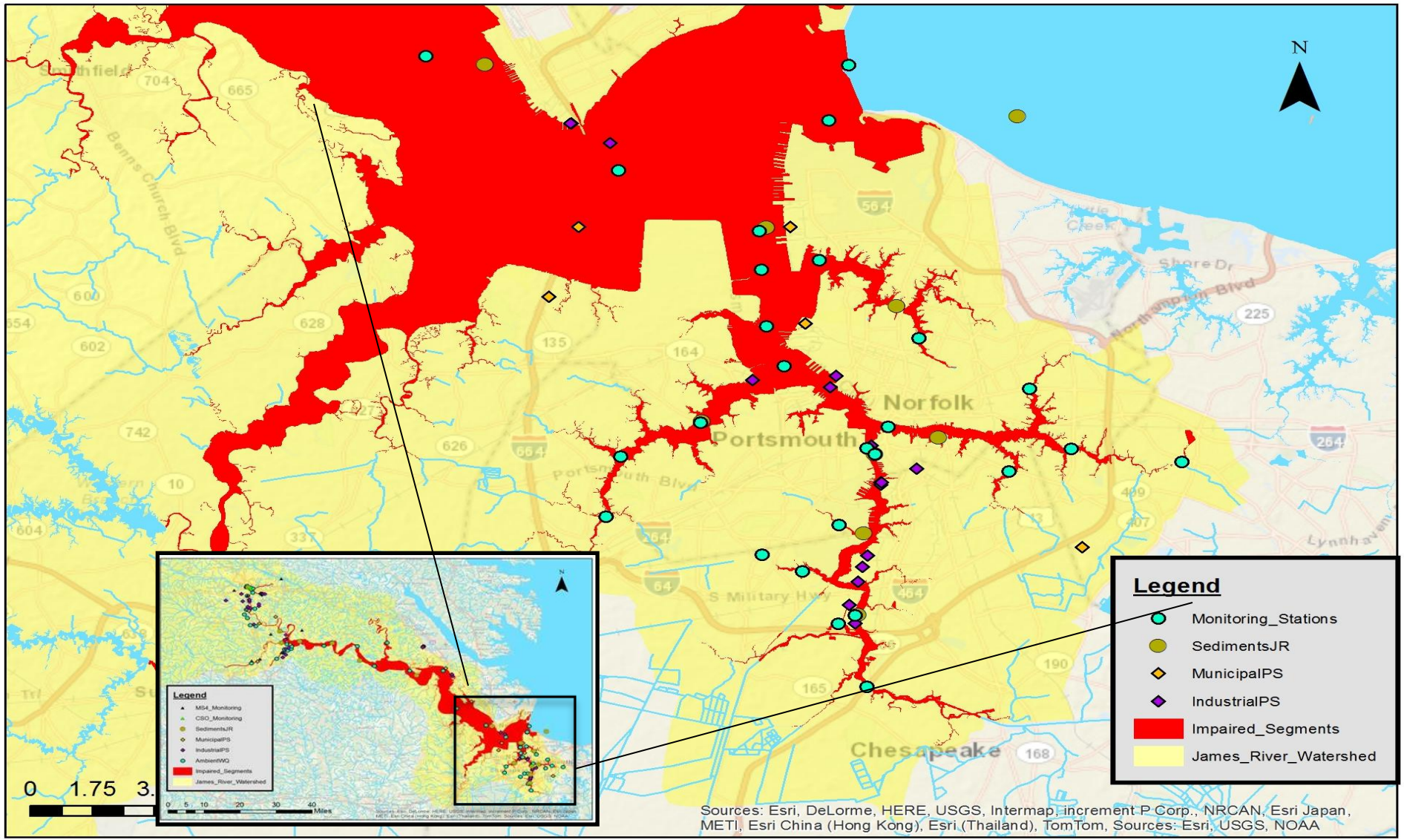
Tidal James River Watershed PCB Source Investigation Monitoring



Entire tidal watershed incl. for enhanced PCB modeling

Elizabeth River Watershed PCB Source Investigation Monitoring



TMDL Source Investigation -

- PCB Field Study
  - PCBs hydrophobic but found in water matrix (TSS)
    - PCB data from water matrix a TMDL need
- Improved PCB analytical methods
  - EPA Method 1668 – Detects PCBs in water (ultra-low concentration)
    - Important PCB TMDL development tool
    - Establish concentrations from a source & convert to active PCB loadings
      - Applicable to all TMDL Source Categories when data available

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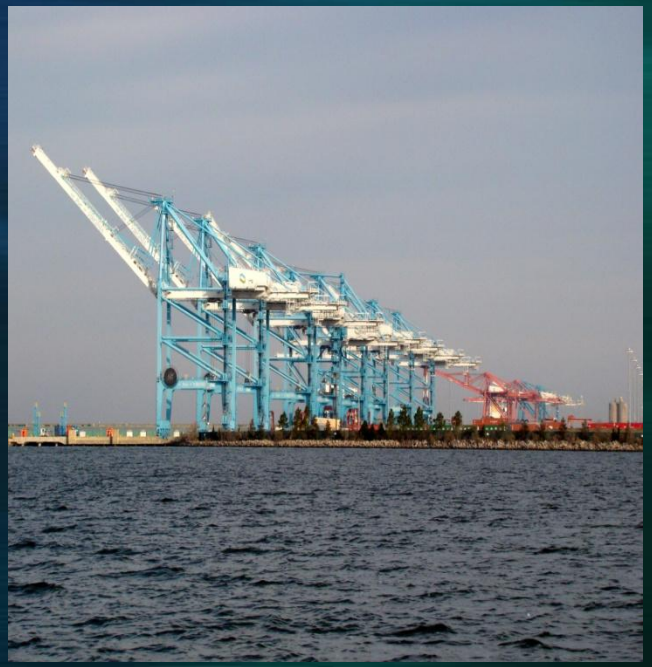
TMDL Source Identification Studies

- Ambient water PCB results necessary to develop TMDLs
  - Source identification
  - Assist in the development of site specific PCB endpoints if necessary
  - Fate & Transport model calibration/validation
- Tidal James & Elizabeth Rivers (2009 - 2013)
  - 68 Sites and 193 samples
  - Baseline and/or elevated flows



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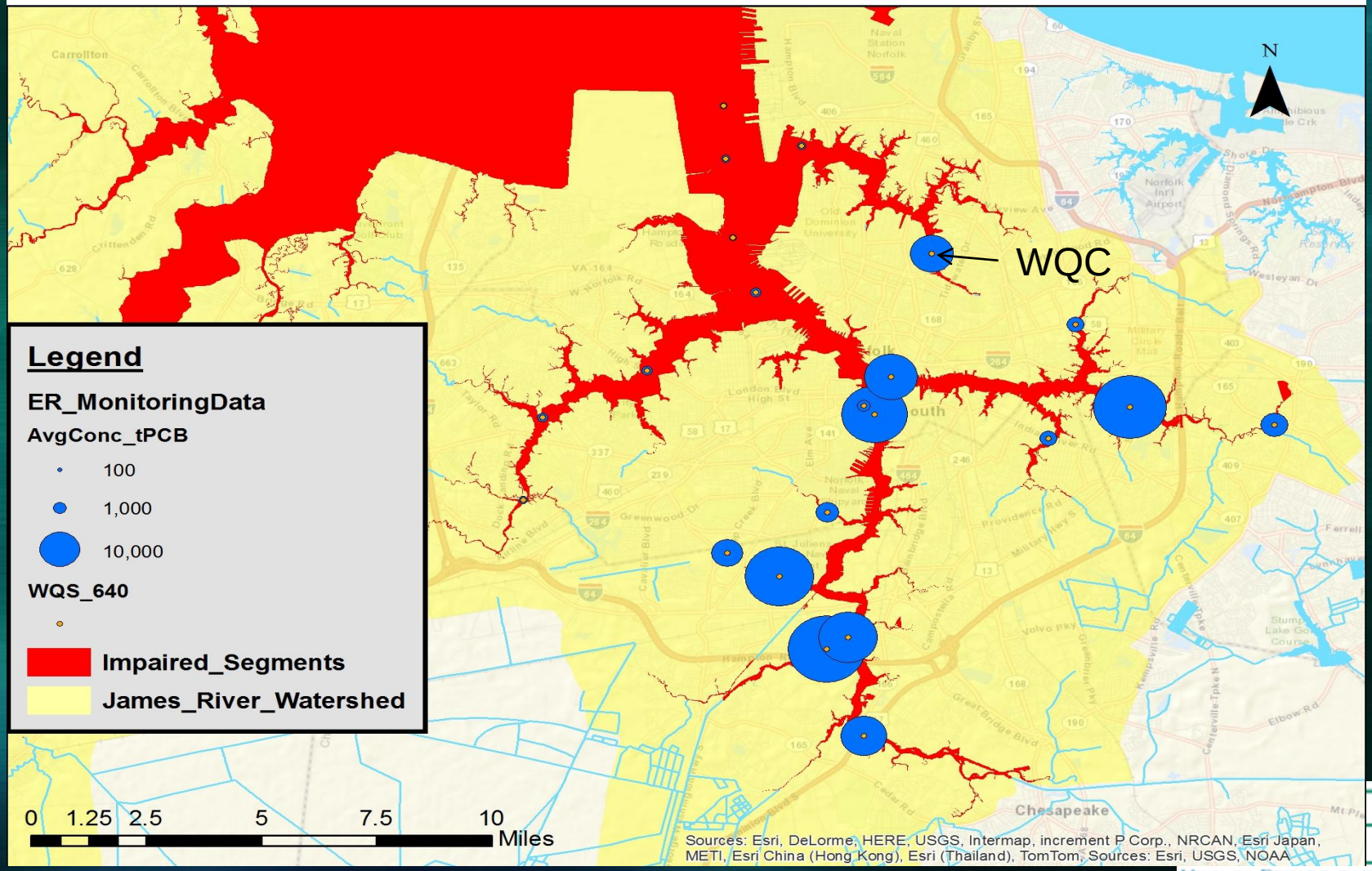
Elizabeth River Watershed Ambient Water tPCB Results (Mean Conc.)



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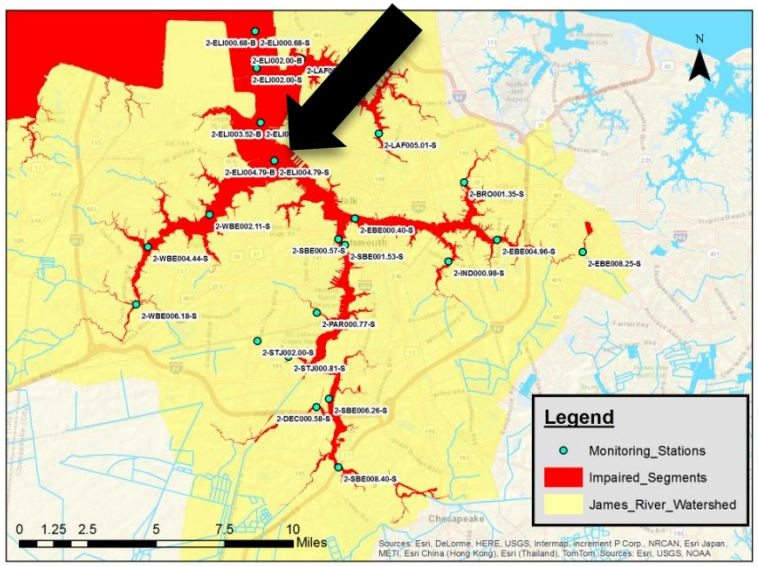
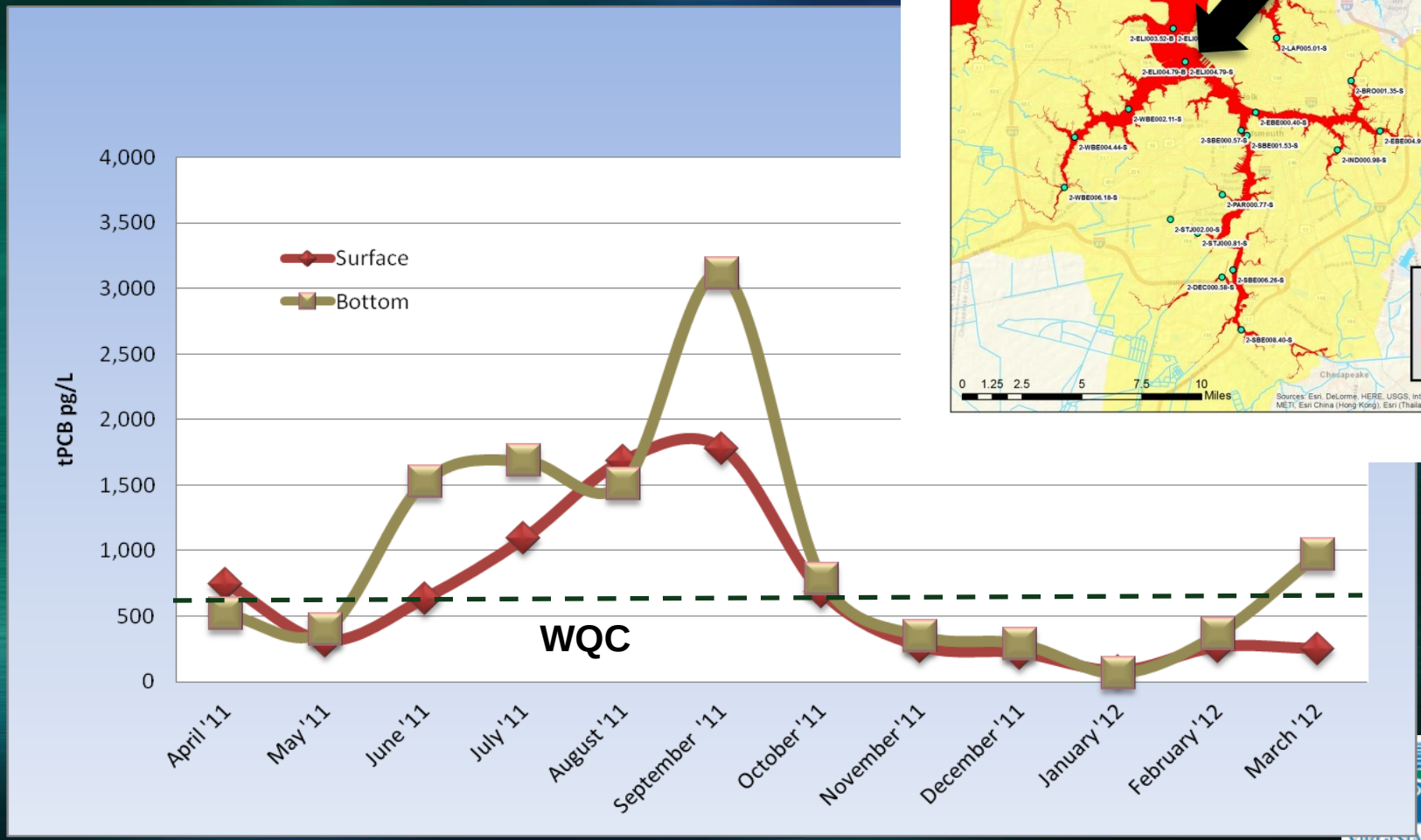
Monthly tPCB Results Collected from the Elizabeth River (RM 4.79) for a Period of One Year





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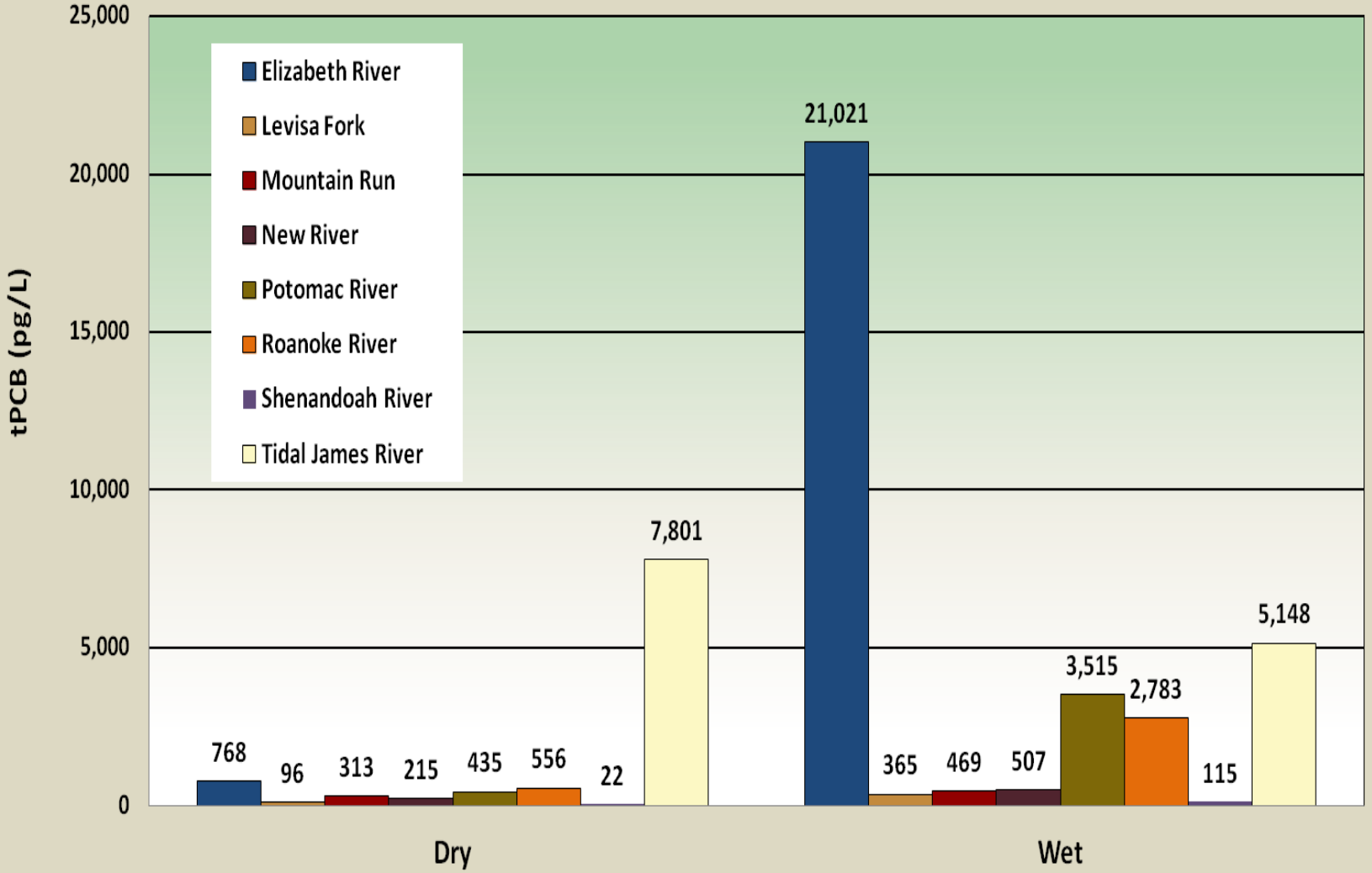
Mean tPCB (pg/L) Concentrations from Ambient Water in Six Watersheds Collected Before and After Precipitation Events



WQC = 640 pg/L

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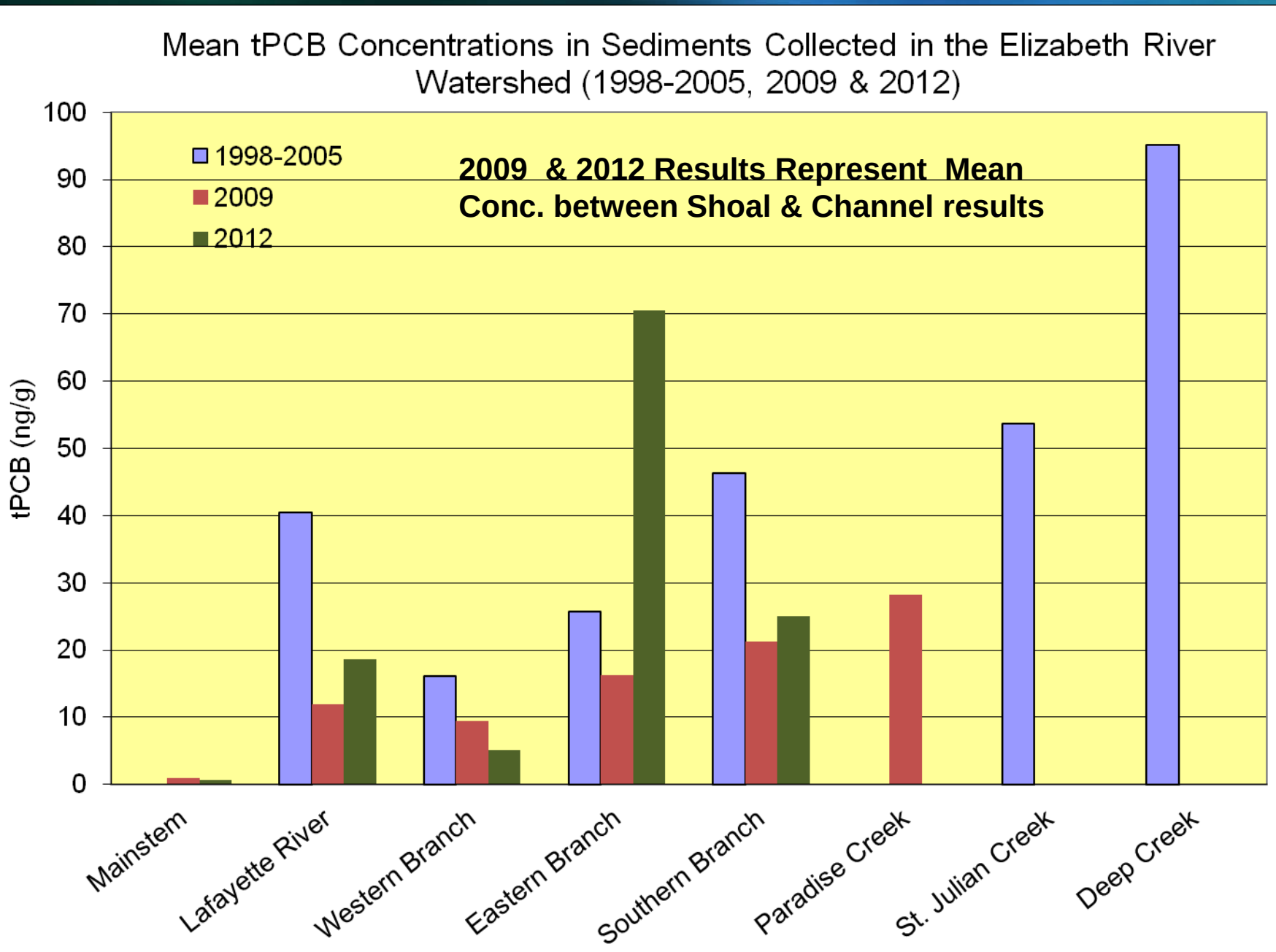

Missing Bar = Sample not collected

TMDL Source Category - Point Source

Results from Facilities Located in PCB Impaired Waterbodies

WQC = 640 pg/L

Basic Statistics			
	Statewide	Tidal James River	Elizabeth River
Facilities monitored	141	21	29
Total PCB Results (n)	587	65	76
Mean Concentration (pg/L)	65,290	10,802	24,199
Median Concentration (pg/L)	1,342	1,170	3,256
Min/Max (pg/L)	0 – 7,477,679	57 – 254,016	141 – 781,030
Results > 10,000 pg/L	108	9	21
Results > 500,000 pg/L	16	0	1

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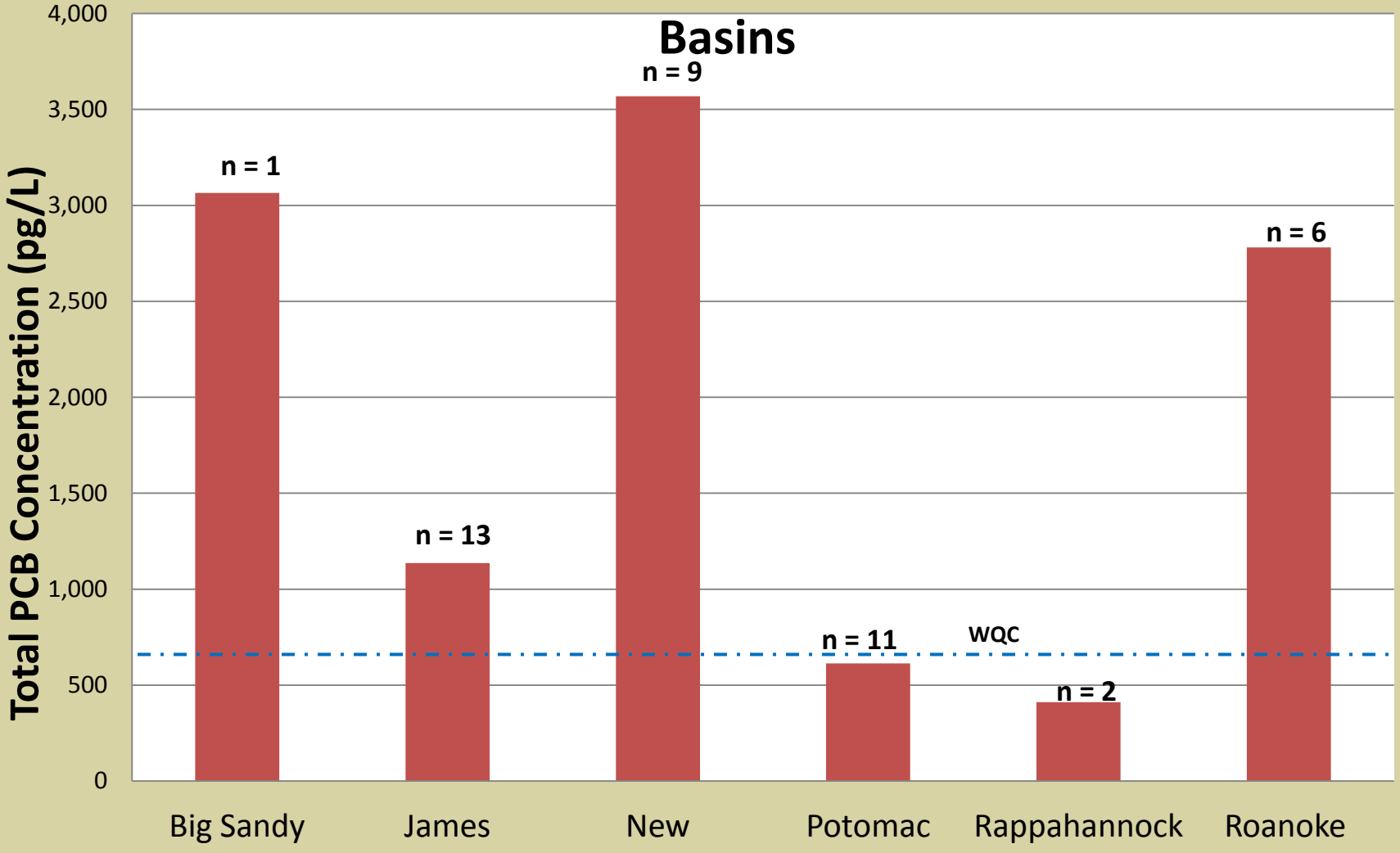
Mean tPCB Conc. (pg/L) from Municipal Waste Water Treatment Facilities Located in Six Virginia River Basins



*** total sample size = 172**
n = facilties

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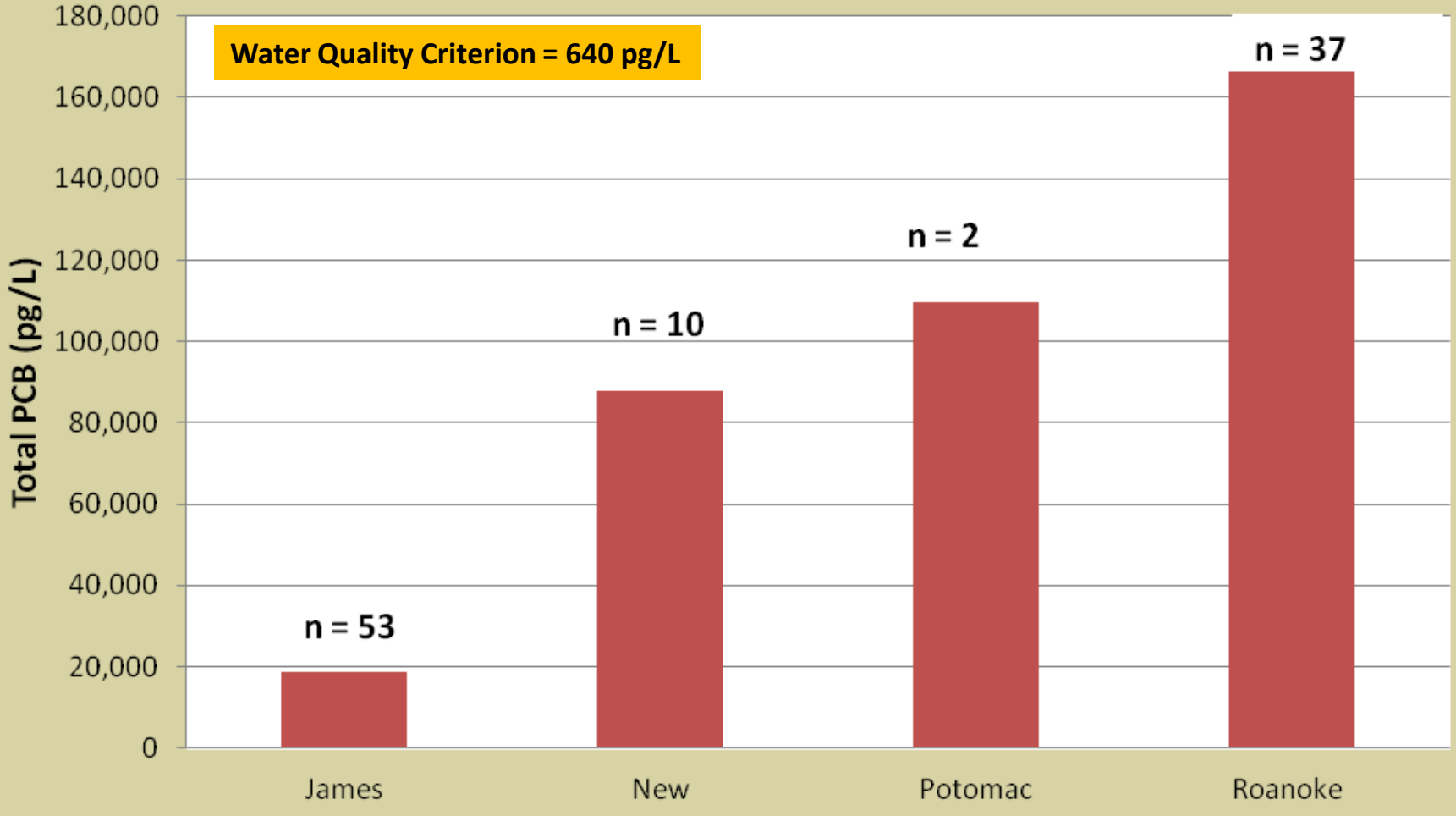
Mean tPCB Conc. (pg/L) from Industrial Facilities Located in Four Virginia Basins



Total sample size = 417
n = facilities

TMDL Source Category – Point Sources (Tidal James River)

- Point Source Guidance (TMDL GM 09-2001)
  - Voluntary requests to generate PCB data (’09-’13)
    - VPDES - 70; participants = 24 (~34%)
    - Storm Water Industrial - 105 (17 terminated); participants = 5.7%
- Participating Facilities (TMDL process)
  - All facil. asked to participate will receive a Waste Load Allocation (WLA)
  - Baseline PCB concentration calculated using tPCB concentration and flow
  - Comparison of baseline with WLA will determine need for reduction

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TMDL Source Category – Point Sources (Tidal James River)

- Non participating facilities
  - Default PCB concentration to be used for TMDL baseline load
    - Will be compared to WLA
  - PCB effluent screening requirement will be included as future VPDES permit special condition
    - Applicable General Permit holders will receive the request via letter

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PCB TMDLs – Point Sources

- Recent Guidance development
  - *"Procedures for reviewing and deriving total PCB concentrations from samples analyzed using low-level PCB method 1668 to be used in development and implementation of TMDLs"*
  - TAC meeting held November 2013
  - Under final internal review
  - Target completion March 2014 (?)
    - Will be posted on DEQ's TMDL (PCB) website
- Finalize PCB concentrations for loading calculations

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TMDL Source Category - CSO

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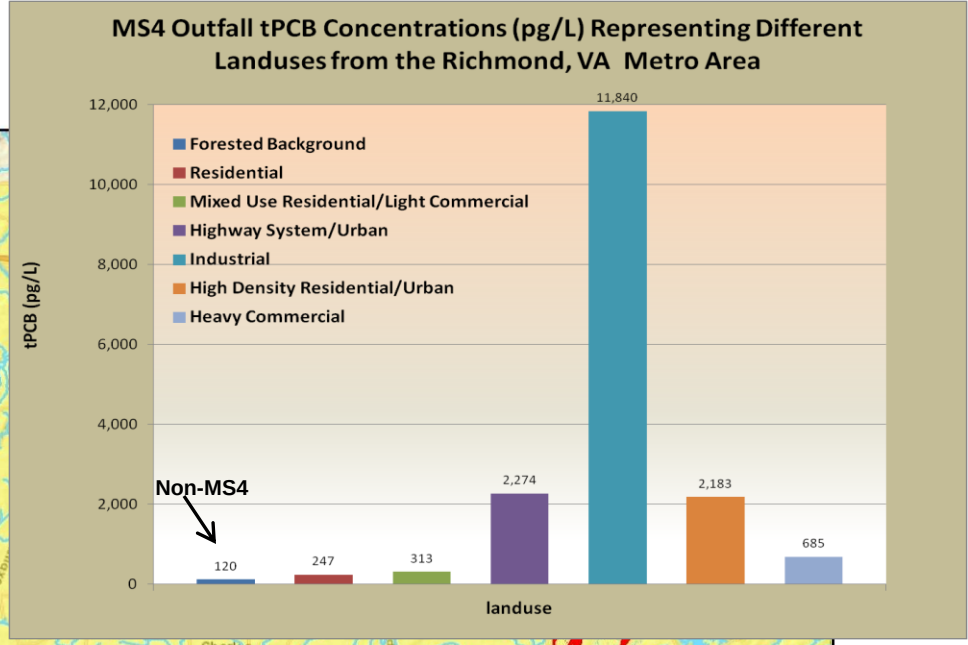
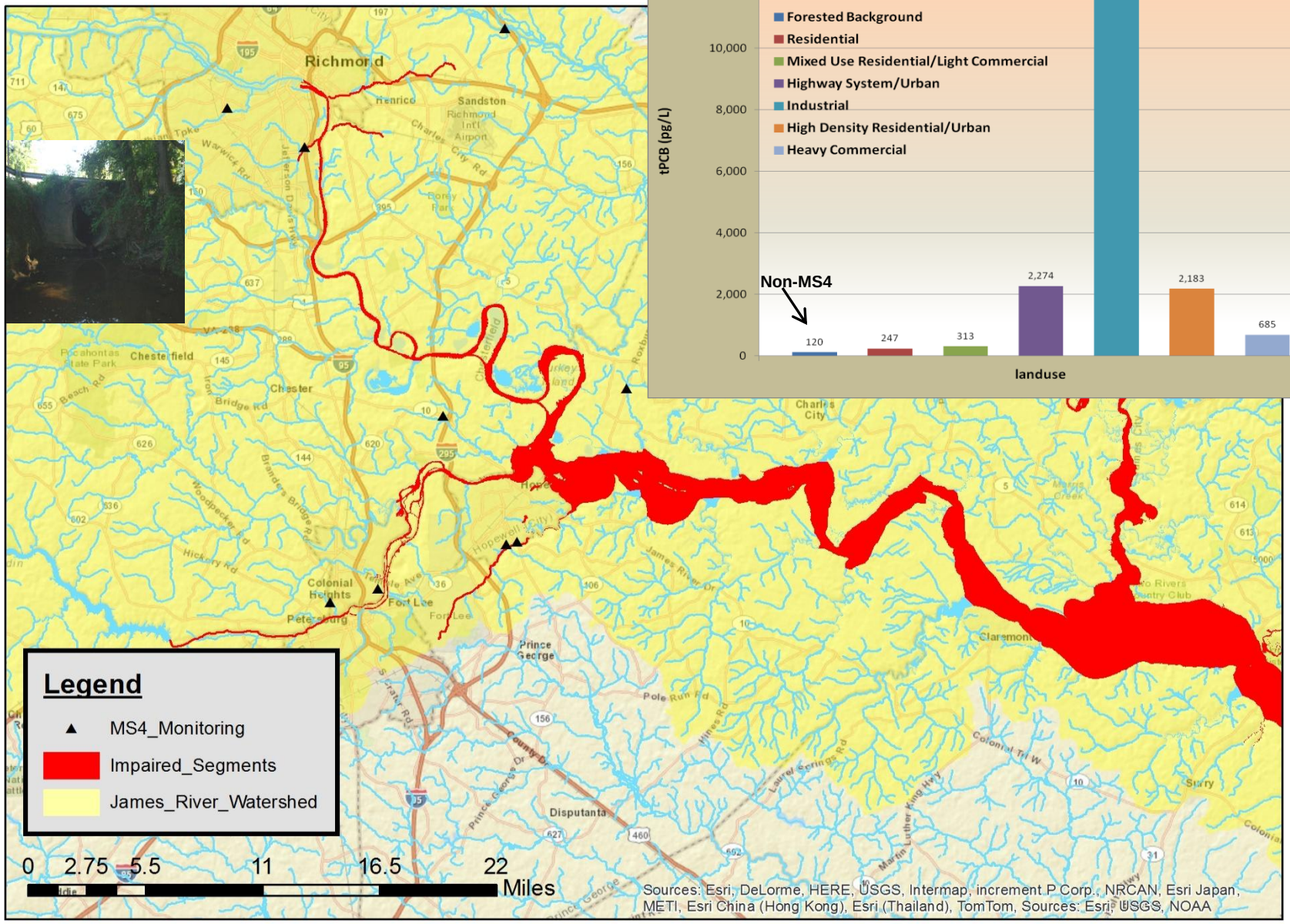
TMDL Source Category - MS4





TMDL Source Category- Contaminated Sites

- Military Installations
- RCRA Corrective Action
- Voluntary Remediation Program
- Landfills
- Miscellaneous spill sites

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Project Timeline

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Next Steps (External Model Inputs)

- Calculate baseline PCB loads from point sources (to include MS4s and CSOs)
- Estimate PCB loads from contaminated sites
  - Compiling list
    - Establish site coordinates/footprint
    - Use available PCB data
    - Apply model (e.g., RUSLE2) to simulate runoff/load
- Estimate PCB loads from atmospheric deposition

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Tidal James River PCB TMDL Development

- Goal – Restore Fish Consumption Use
- Prospective timeline

Item	2009	2010	2011	2012	2013	2014				2015		
						Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
PCB Field Monitoring			complete									
Fish Tissue Monitoring												
Pt. Source Monitoring												
Technical Advisory Comm												
Public Meeting												
Model Development												
External Inputs												
Draft TMDL (Development)												
Public Comment Period												
Complete TMDL												

*** Additional TAC/Public Meetings can be held as necessary**

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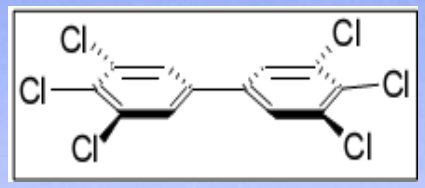

Questions

Mark.richards@deq.virgnia.gov

http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/PCBTMDLs.aspx

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